TRAINING COURSE

FOR the

INELVIZ

METEOROLOGICAL DISPLAY

February 2003

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION
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TRAINING OUTLINE

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Part 1. **Meteorological Measuring Network Overview**
Operation of Inelviz Software

Part 2. **MDIFF Diffusion Model**
Integration with RSAC

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1.0   Introduction

InelViz is a computer program developed at NOAA/ARLFRD to display near real-time meteorological data from our 35 station meteorological network or Mesonet for short. Its original function was to provide meteorologists a snap shot of current meteorological conditions on and around the INEEL. Over the years its function has expanded to include plume dispersion model projections and as a tool in supporting Emergency Response operations. The InelViz software is currently installed on more than 50 computers on and around the INEEL.

2.0   Mesonet

The Mesonet is the source of most of the weather information displayed in InelViz. The Mesonet, currently comprising 35 stations, extends from Minidoka on the south to Dubois on the north and east from Sugar City to Richfield on the west covering an area of approximately 12,000 square miles. All towers are 15 meters (50 feet) in height, with the exception of 3 tall towers located at Grid3, EBR2 and LOFT (for a list of station acronyms refer to Appendix D.). All but 5 stations run off AC power. The 5 stations without AC power use Solar Cells to power the instrumentation while simultaneously charging a battery, which then powers the station during the night.   Figure 2.1 shows the distribution of stations and the associated meteorological instrumentation for each tower. The tower instrumentation varies between sites and InelViz accounts for this variation by displaying only those parameters available at a particular site.
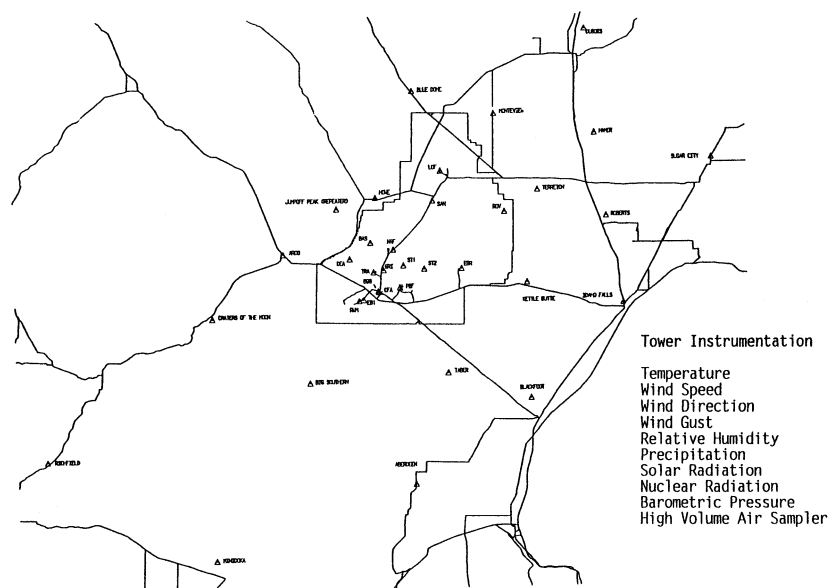
Figure 2.1 - FRD Mesonet

3.0   Data Collection

At the heart of the data collection system is the Campbell Scientific CR10 data logger. Each tower contains a CR10 housed in a weather proof container.   A data sample is taken once a second for each meteorological parameter. The samples are accumulated each second then averaged at the end of the 5 minute sampling period.   All values displayed in InelViz are 5 minute averages, the exception being wind gust, which is the peak or maximum measured during the sampling period. The data is then transferred, using radio waves, from the tower to a repeater, located on JumpOff peak, back to our office and collected by a base station then stored on a data computer. Collecting the data from every tower takes approximately 2 1/2 minutes. Therefore data from any sampling period will become available 5 minutes after the end of the sampling period. After collection the data is then available for InelViz to download and display. Figure 3.1 shows the data collection and distribution system used in the FRD Mesonet. In addition to FRD Mesonet data, InelViz also displays National Weather Service (NWS) data and Remote Automated Weather Station (RAWS) data. NWS sites are displayed in blue on the InelViz map and RAWS sites are displayed in magenta. The availability of this data varies between sites and is usually displayed only once an hour. To turn the NWS and RAWS sites on and off refer to the Features menu described in section 5.2.
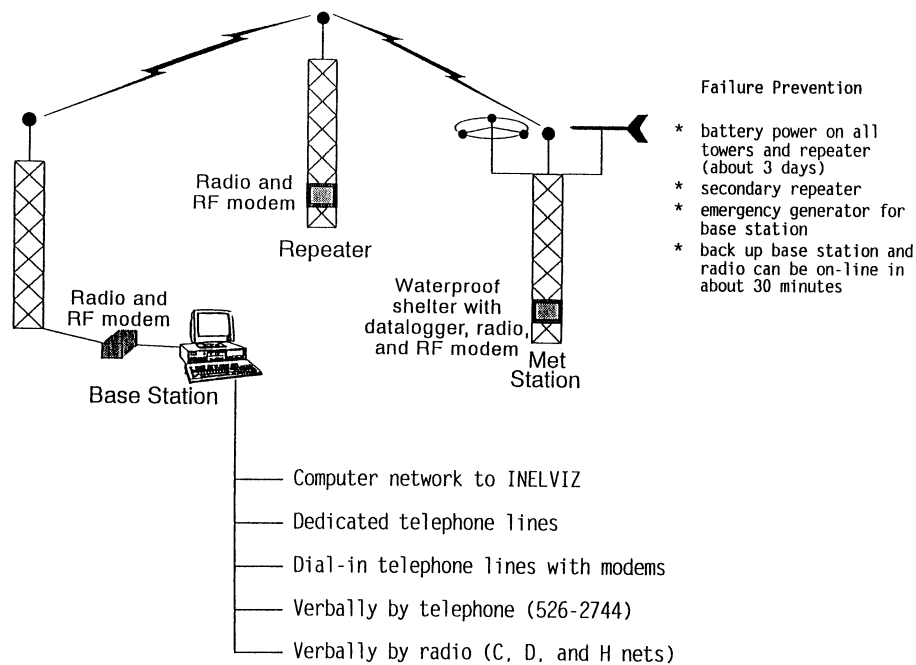
Figure 3.1 - FRD Meteorological Data distribution

4.0   Data Display

Figure 4.1 shows the InelViz interface and the features used to display the meteorological data, followed by a description of each element. Three years of 5 minute meteorological data can be accessed through InelViz. If a complete set of data is available InelViz will retrieve a new data file every 5 minutes. If for some reason all the data does not come through during the initial collection phase InelViz will then retrieve the data every minute. In addition to the 5 minute data InelViz displays the NWS and RAWS data mentioned in section 3.0. All collected data is stored on the data computer in Mountain Standard Time (MST). Therefore InelViz keeps track of time zone information in order to retrieve and display the correct data files.
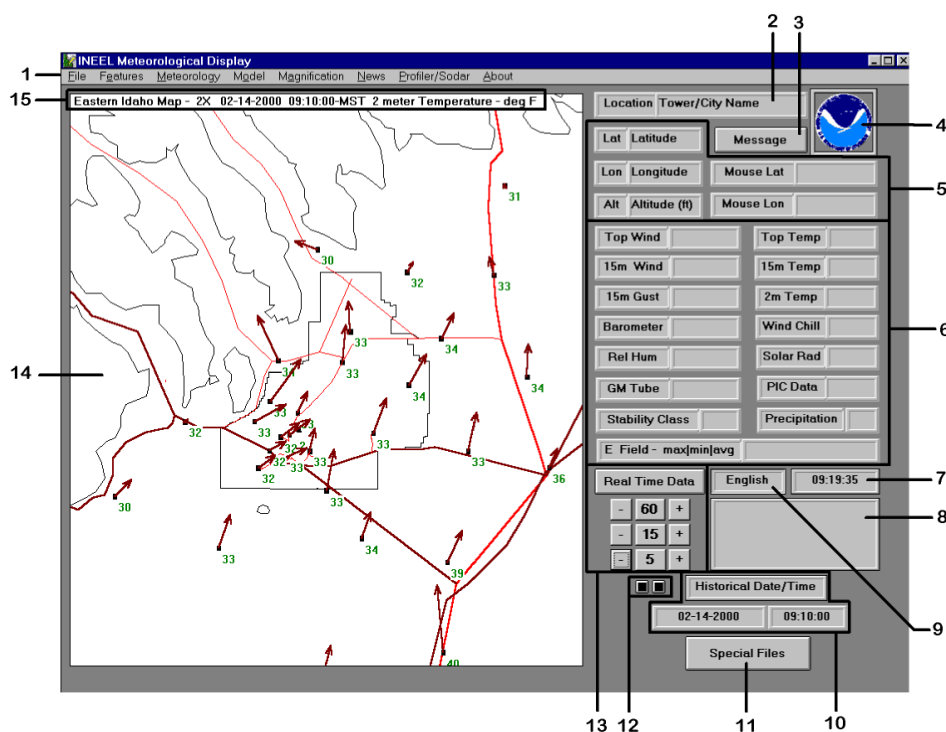
Figure 4.1 - InelViz Interface

4.1   **Menu Bar** - Displays the available menu items which are described in section 5.0.

4.2   **Location** - When a square or dot is selected from the map, using a right mouse click, the Tower/City name is displayed in this box. The squares symbolize towers and the dots symbolize cities or INEEL site locations.   If you click on the Tower/City Name caption, a drop down alphabetized list, of available data sites, including the NWS and RAWS sites, is revealed. After selection the wind arrow at the corresponding site turns red.

4.3   **Message Button** - This button turns red when InelViz receives a message from our office. Messages are sent to inform users of new versions of InelViz, weather warnings, network outages, etc. Clicking the button displays the message which can also be printed.

4.4   **NOAA Logo** - Clicking the logo causes it to expand and contract.

4.5   **Lat/Lon/Alt** - These boxes display the latitude, longitude and altitude of the selected site. Cities do not display an associated altitude.
        Mouse Lat/Lon - the latitude and longitude of the current mouse position is displayed in these two boxes.

4.6   **Meteorological Data boxes** - Displays the meteorological parameters available for a particular site. Not all sites are instrumented identically , so different parameters will be displayed when selecting a specific site. For example, the Top Wind and Top Temp values are only available on 3 towers: LOFT, EBR2 and GRID3. Likewise the Electric Field (E Field) measurements are only available at: LOFT, EBR2 and TRA. The units associated with each parameter are discussed in Appendix C.

4.7   **Computer Clock** - Displays the current computer time in hours minutes seconds using a 24 hour clock; therefore 8:00:00 p.m. is displayed as 20:00:00. Double-click the clock to adjust the time. Select which element to advance or decrease, then click the increment arrow.

4.8   **Status Display** - Displays status or error information when retrieving data or sending and retrieving model results. A blue progress bar is displayed in this box when the model is set to AutoRun mode. When the progress bar spans the width of the box, a new model run will be initiated.

4.9   **English/Metric** - This box reflects the selected units for the meteorological values. Values are displayed in either English or Metric and can be toggled by clicking the box. Metric units pertain only to temperatures, wind speeds and direction. When English is selected all values are displayed in black, when Metric is selected the associated values in the data boxes and on the map are displayed in red. This box also displays the distance between 2 points when the *Distance Utility*, described in section 5.2.2, is selected.

4.10   **Historical Date/Time** - Clicking the Date or Time boxes under this title bar displays input boxes for specifying the desired Date and/or Time. Dates can be entered using 2 or 4 digit years and in either mm/dd/yy or mm-dd-yy format. Times are entered with the hour and minute using a 24 hour clock. For example to see data from 10:10 p.m. enter 22:10.

4.11   **Special Files button** - FRD can generate simulated data for a number of different scenarios. We place this data on our servers and make it available to InelViz. Selecting the Special Files button tells InelViz to retrieve only simulated data and ignore real data. InelViz will run normally as long as simulated data remains available. This button turns red in Special Files mode.

4.12   **Black Buttons** - These buttons display program activity. The right button turns red

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when InelViz retrieves a new 5 minute data file. The left button turns red when a model run is requested and when the results are retrieved.

4.13   **Real Time Data buttons** - The button labeled Real Time Data allows the user to toggle between Current data and Historical data (Historical data being anything other than the current 5 minute file). In Historical mode the caption reads Historical Data and the button turns red.
60:15(30):5 - By clicking the + or - sign next to these buttons you can step forward or backward through Historical data. The increments are 60, 15/30, and 5 minute intervals. Clicking the 15 minute button toggles between 15 and 30 minutes. Three years of Historical Data is available through InelViz.

4.14   **Map** - The map displays the Mesonet station locations with wind arrows and one other parameter. The meteorological parameters available, are displayed under the Meteorology menu.

4.15   **Map Title** - This title displays information about the data on the map. Included is the map magnification (2X in Figure 4.1), the Date and Time of the data and the meteorological parameter with associated units.

5.0   Menu Items

The available menu items change with different InelViz configurations. Some configurations provide model and profiler menus. InelViz automatically configures itself at startup depending on which features are made available for a particular user. Following is a description of the available menu items.

5.1   **File**

5.1.1   **Print Screen** - Prints a bitmap of the entire screen.
5.1.2   **Exit** - To stop InelViz use the Exit Menu or click the X in the top, right hand portion of the window.

5.2   **Features**

5.2.1   **Edit Map Features** - The following form (Figure 5.1) is displayed when this menu item is selected. Check and uncheck the boxes to turn features on and off. Those items in gray are currently unavailable.
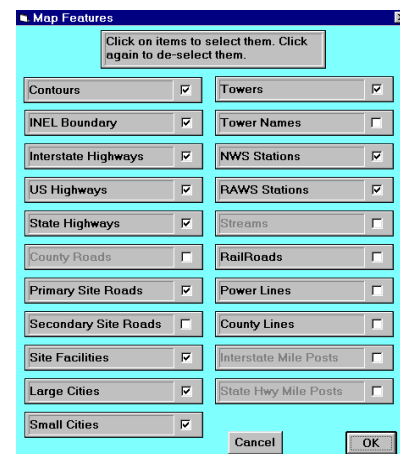
Figure 5.1

5.2.2 **Distance Utility** - Utility for measuring distance between 2 points on the map. To use this feature, check the menu item, the cursor will change, indicating the distance utility is enabled. Next, select a point on the map with the left-mouse button. Continue to hold the button down while moving the cursor to the desired point and release the mouse button. The distance is displayed in the *English/Metric* box in either miles or kilometers depending on the selected units.

5.2.3 **Set Discrimination Level** - This option allows the user to set a threshold value for display of the specified meteorological parameter. The values above the threshold will be displayed, on the map, in green, those below in red.

5.3   **Meteorology**

Items under the meteorology menu display meteorological parameters on the map. Only 1 parameter, along with wind arrows, can be displayed. To display all parmeters at a given site click the site location on the map. The values are displayed in the boxes to the right of the map.

5.3.1 **15m Wind Arrows** - Displays the wind direction at a height of 15 meters above the ground. The length of the arrows is proportional to the wind speed. For an explanation of wind direction refer to Appendix C, or the InelViz Glossary.

5.3.2 **15m Wind Data** - displays the wind direction in degrees and the wind speed in mph or meters/sec (direction/speed) at the 15 meter height.

5.3.3 **15m Temperature** - Displays the temperature in degrees Fahrenheit or Celsius at 15 meters.

5.3.4 **2m Temperature** - Displays the temperature in degrees Fahrenheit or Celsius at 2 meters.

5.3.5 **Solar Radiation** - Displays the solar radiation in watts per meter squared.

5.3.6 **Relative Humidity** - Displays humidity in percent (%).

5.3.7 **Barometric Pressure** - Displays barometric pressure in inches of mercury (Hg).

5.3.8 **GM Tubes** - Geiger Muller Tubes display nuclear radiation, specifically gamma radiation, in micro R per hour. Micro R is defined in Appendix C and the InelViz Glossary along with other relevant InelViz terms.

5.3.9 **Pic Data** - PIC is an acronym for Pressurized Ion Chamber. It also measures gamma radiation using the same units as the GM Tubes. The Pic instruments are owned and maintained by the State of Idaho INEEL Oversight Office.

5.3.10 **Electric Fields (max|min|avg)** - The electric field sensors measure the amount of electric charge in the air in units of kilovolts/meter (kV/m). FRD has 3 sensors deployed on the INEEL. One at TRA one at LOFT and the other at EBR2. These 3 locations provide coverage of the entire INEEL. They are used to measure the potential of a lightning strike within the measurement area of the sensor. Values below 2 kV/m are unlikely to produce lightning.

5.3.11 **Units**

5.3.12 **English** - Displays meteorological and distance values in standard English units. Exhibits the same functionality as the box described in section 4.9.

5.3.13　**Metric** - Displays meteorological and distance values in metric units. Exhibits the same functionality as the box described in section 4.9.

5.3.14　**Time** - This sets the time of the data displayed in the Map Title, **NOT** the computer time.

5.3.15　**Local** - Displays <u>Data Time</u> in the time zone selected by the user, example Mountain Daylight Time (MDT).

5.3.16　**MST** - Displays <u>Data Time</u> in Mountain Standard Time (MST).

5.3.17　**GMT** - Displays <u>Data Time</u> in Greenwich Mean Time (GMT).

5.4　Model

5.4.1　**Generate Model Output** - Figure 6.1 shows the form displayed when this menu item is selected. Refer to section 6.1 for details.

5.4.2　**Choose Saved Model Output** - Displays a list of saved model runs for redisplay. Each item in the list contains the run number, release location, release time, date and type of release, either RSAC or TIC. To redisplay either double-click or highlight the model run and press the select button.

5.4.3　**Hide Trajectory** - This item can be checked or unchecked. When checked the model results are displayed with the isopleths visible and the trajectories hidden. Unchecking redisplays the trajectories.

5.4.4　**Hide Isopleth** - This item can also be checked or unchecked exhibiting the same behavior as the trajectories. One difference between the two is if the Hide Isopleth item is checked and a new model run is initiated, by default the Isopleths will be displayed and the menu item unchecked.

5.4.5　**Hide Trajectory and Isopleth** - Selecting this menu item erases the model information and redisplays the meteorological data.

5.4.6　**Delete Save Model Output** - Selecting this item displays the list of model runs described above. Multiple models can be deleted by highlighting individual runs or a block of runs, and pressing the delete button.

5.5　Magnification

Under the magnification menu item 6 different magnification levels are displayed: **1x**, **2x**, **4x**, **8x**, **16x** and **32x**. Selecting the 1x magnification displays a topographical base map of the surrounding Snake River Plane. Increasing the magnification allows spacial separation of items displayed on the map, but it does not increase the level of detail displayed.

5.6   News

Figure 5.2 shows the dialog box displayed when the News menu is selected. The Figure shows a partial list of supplemental files downloaded through InelViz.
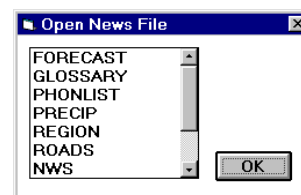

Figure 5.2

5.6.1   **FORECAST** - A twice daily forecast for CFA issued by FRD at 9:00 a.m. and 3:30 p.m.

5.6.2   **GLOSSARY** - A list of terms and definitions used in InelViz.

5.6.3   **PHONLIST** - A list of phone numbers and names to contact for assistance with InelViz and other weather related information.

5.6.4   **PRECIP** - A list of precipitation totals for stations with range gauges. The list includes the precipitation totals for the last 15 minutes, 1 hour and 3 hours.

5.6.5   **REGION** - A supplemental table of regional weather information.

5.6.6   **ROADS** - NWS State-wide road conditions (available only during the winter).

5.6.7   **NWS** - National Weather Service forecasts for areas within Idaho.

5.6.8   **FIRE** - National Weather Service forest and range fire warnings and forecasts for areas in and around Idaho.

5.6.9   **HINTS** - Hints on InelViz operation and speacial features.

5.6.10   **HISTMTCH** - Primarily used by FRD meteorologist, as a tool for evaluating the performance of the InelViz forecast model.

5.7   Profiler/Sodar

Most configurations of InelViz do not include this option. The information from the profiler and sodar is primarily used by meteorologists to determine the stability of the atmosphere and to enhance their forecasts. The profiler uses reflected radio waves in the 915 Mhz frequency range to measure wind speed and direction to a height of 3 miles. The temperature measurements can be made to a height of about 1 mile. The sodar uses sound waves to make its measurements and returns speed and direction from a height of about 1 mile. Figure 5.3 shows the speed and direction display for the profiler. When the profiler or sodar graphs are displayed all menus except the File, News and About menu are disabled. To turn the profiler or sodar display off simply unselect the menu item.
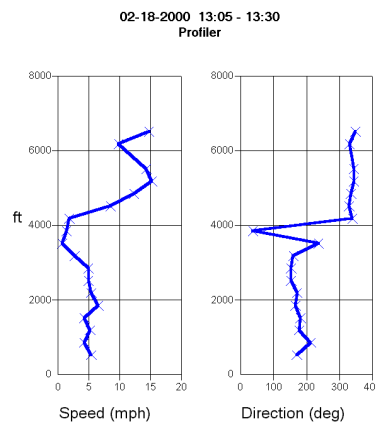
Figure 5.3

5.7.1 **Profiler Speed/Direction** - Displays upper air wind speed and direction.

5.7.2 **Profiler Temperature** - Displays upper air temperature.

5.7.3 **Sodar Speed/Direction** - Displays upper air wind speed and direction.

5.8 **About**

5.8.1 **About INEL Meteorological Display** - Displays InelViz version information.

5.8.2 **Change Time Zone** - Dialog box for changing the time zone. InelViz was written before the advent of Windows 95 and therefore needs to keep track of the time zone internally. The time zone should only need to be set once during installation.

6.0 InelViz - MDIFF Model Interface

Figure 6.1 and 6.2 show the InelViz-MDIFF model interface and the various parameters used in model generation.
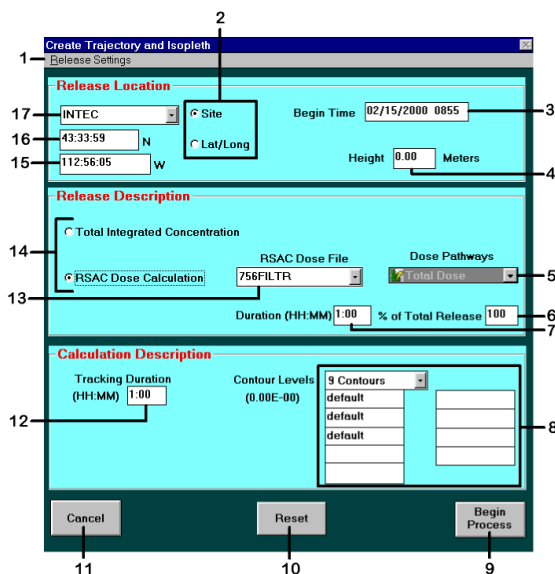
Figure 6.1 - Model Interface
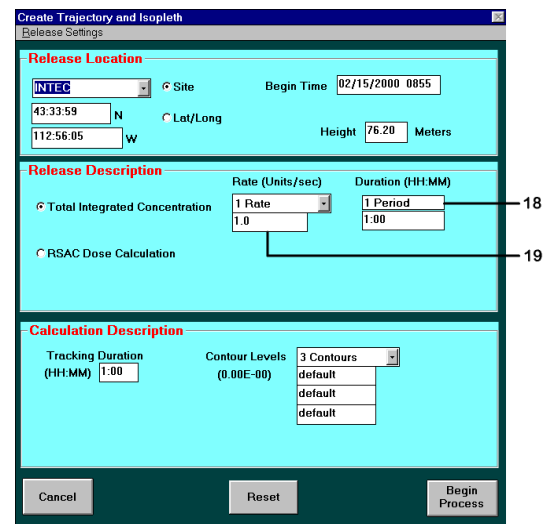
Figure 6.2 - TIC selected

6.1 **Release Settings menu**

6.1.1 **Forecast** - Enables Forecast mode. The model will then run using forecast wind data. The forecasted winds are generated every 30 minutes using a historical pattern matching technique. One hour 30 minutes up to 2 hours 30 minutes of forecasted winds are available. The model output will display the forecasted trajectories in red and trajectories from actual data in black.

6.1.2 **Snap Shot** - In snap shot mode the model calculates only the current

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location of the plume from the most recent 5 minute puff rather than the accumulated plume footprint.

6.1.3 **Auto Run** - InelViz will automatically update the model display every 5 minutes as new data becomes available. A *Continuous Release* will increment the release time and the tracking time every 5 minutes. A *Finite Release* will only increment the tracking time.

6.1.4 **Exclude Towers** - Provides a list of towers to exclude from the current model run. This should generally be reserved for the meteorologist who understands windfield data that appears suspect and should be excluded.

6.2 **Release Site**

6.2.1 **Site** - A drop-down list of 8 predefined release locations. The locations are: EBR2, INTEC, LOFT, NRF, PBF, RWMC, TAN and TRA.

6.2.2 **Lat/Long** - Provides the user with instructions on selecting an arbitrary release location by clicking a point on the map with the mouse. The model entry form will be minimized while the user selects the release location.

6.3 **Begin Time** - Displays the Date and Time entry form for the release. The Date and Time can be typed in manually or the arrows can be used to scroll the Date and Time forward or backward. If you use the arrows to scroll the Date you can only scroll 100 days in either direction.

6.4 **Height** - Specifies the height, in meters, of the release point. The 8 predefined sites each have a default release height. All RSAC releases are assumed to be ground releases.

6.5 **Dose Pathways** - A list of available dose pathways: Inhalation, Ingestion, Ground Surface, Cloud Gamma and Total Dose. Selecting Total Dose generates a plume that is calculated from the available pathways for the given scenario. Refer to Appendix E for a sample RSAC dose conversion file.

6.6 **% of Total Release** - This is a percentage of the total releaseable material, NOT the total material in inventory.

6.7 **Release Duration** - Duration of the RSAC release. The duration values should be entered in the form HH:MM. For example 2 hours 5 minutes would be entered as 02:05. InelViz will only accept duration values in 5 minute increments. *InelViz cannot accept release durations longer than 24 hours.*

6.8 **Contour Levels** - Contour levels displayed in the plume calculation. The user can accept the default values or enter their own for 1 to 10 contours. RSAC defaults to 9 contours, TIC defaults to 3 contours. Note, if you manually enter contour values that fall outside the range calculated by the model, those contours will NOT be displayed.

6.9 **Begin Process** - Initiates the model run and closes the model entry form.

6.10 **Reset** - Resets all model entry parameters to their original values, except the release date and time.

6.11 **Cancel** - Closes the model entry form while preserving all model entry settings and values.

6.12 **Tracking Duration** - Length of time required to track the propagation of the

plume. This is separate from Release Duration. The plume can be tracked for many hours after the release has stopped.

6.13   **RSAC Dose File** - Displays a list of default release scenarios for 5 sites: INTEC, PBF, RWMC, TAN and TRA. A pop-up description of the scenario is displayed when you click on the Dose File Box. Appendix E shows some default files with corresponding scenario descriptions.

6.14   **Release Type Selection buttons** - Select either a TIC or an RSAC release. Selecting one hides the other. Section 8.0 discusses the differences between TIC and RSAC releases.

6.15   **Longitude of the Release Location** - Longitude of the release location specified in degrees minutes seconds.

6.16   **Latitude of the Release Location** - Latitude of the release location specified in degreese minutes seconds.

6.17   **Site Box** - Drop-down list of predefined sites described in section 6.2.1.

6.18   **TIC Duration**- The release duration specified in HH:MM. For example 2 hours 5 minutes would be entered as 2:05. The duration is associated with the corresponding release rate described below. InelViz notifies the user when the values are entered incorrectly.

6.19   **TIC Rates** - One to four release rates can be specified to account for multiple release sources. InelViz notifies the user when the values are entered incorrectly.

7.0   Model Results

Figure 7.1 shows the InelViz interface with a model projection and corresponding model parameters, followed by a description of the numbered items.
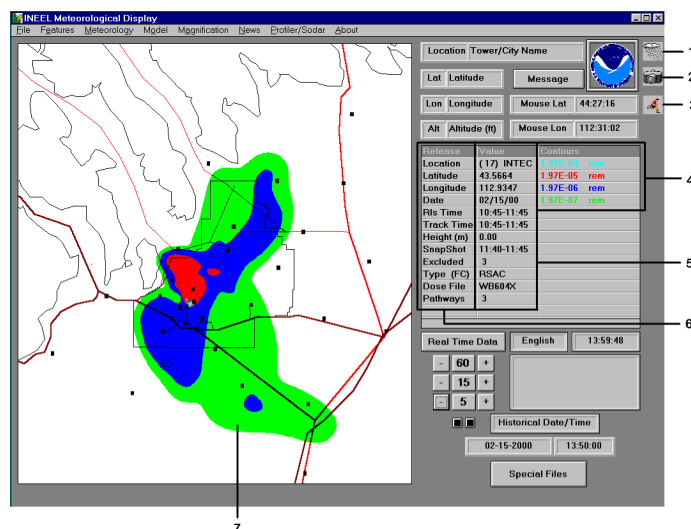

Figure 7.1 - Model Results

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7.1 **Forecast Icon** - This icon is displayed when forecast mode is selected, from the release settings menu on the model entry form (refer to section 6.1.1). It is a visual indicator to the user that subsequent models will be run using forecast data. To deactivate forecast mode either uncheck the menu item or click the icon.

7.2 **Snap Shot Icon** - This icon is displayed when snap shot mode is selected. It too is an indicator that all subsequent models will be run in snap shot mode. To deactivate snap shot mode either uncheck the menu item or click the icon.

7.3 **AutoRun Icon** - This icon is displayed as long as auto run mode is enabled. If the release is continuous a red arrow encircles the runner. Deactivation is the same as above.

7.4 **Contours** - This column displays the values associated with each contour (isopleth). The colors are correlated with the contours on the map as shown in Figure 7.1. RSAC contours are displayed in rem and TIC contours are displayed in curie-second per meter cubed (ci-s/m^3).

7.5 **Release Values** - This column displays the values associated with each of the release parameters described below. The number in the first row designates the model run number, in this example run number 17 and where the release originated.

7.6 **Release Parameters** - This column displays the parameters associated with each release. The number of parameters displayed varies, depending on the model type (RSAC or TIC) and the selected options. Clicking on the release time or the track time will display the current time zone setting for the model run. Clicking on the excluded value (3 in Figure 7.1) will display a list of tower locations excluded from the model run. Clicking on the dose file name (WB604X) will display a description of the given release scenario. Clicking on the Pathways value will display the corresponding pathways used in the RSAC dose calculation. The letters (FC), following the type parameter, indicate the model was run using forecast data.

7.7 **Model Output** - The filled contours (isopleths) from a model run. In this example the output is shown with the trajectories hidden.

8.0 DISPERSION MODELING USING MDIFF

8.1 Planetary Boundary Layer

- **Portion of atmosphere which is directly affected by earth's surface**
- **~1 km deep during day, ~100 m deep at night**
- **Pollutants released near the surface tend to stay within the PBL**

Capping inversion

Surface inversion

Day
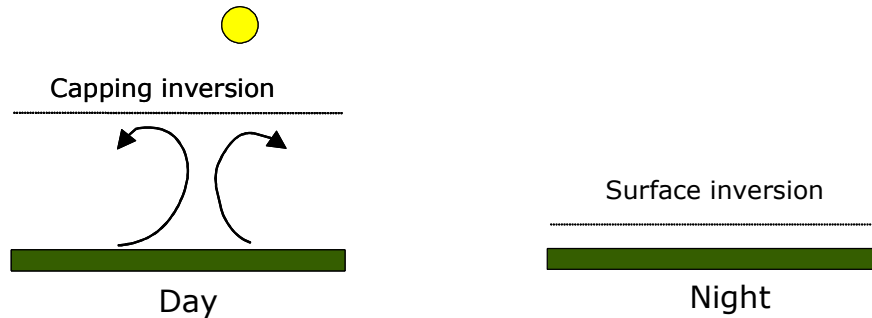
Night

8.2 Boundary Layer Stability

- **PBL turbulence is affected by heating/cooling at surface**
- **Daytime solar heating = thermals = "unstable"**
- **Nighttime cooling = suppressed turbulence = "stable"**
- **No heating/cooling or strong winds = mechanical turbulence only = "neutral"**
- **Pollutant dispersion varies with stability : unstable = most mixing, stable = least mixing**

8.3 Pasquill-Gifford Stability Classes

A : **Strongly unstable**
B : **Moderately unstable**
C : **Slightly unstable**
D : **Neutral**
E : **Slightly stable**
F : **Moderately/strongly stable**

8.4 Modeling of Pollutant Dispersion

- **Many models assume cloud has a Gaussian bell concentration distribution; composite representation**
- **Reflections at ground and top of PBL**
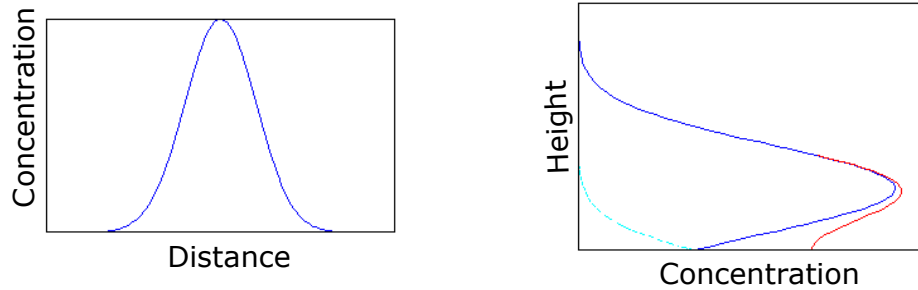
8.5 Gaussian Plume

- **Straight-line transport from source to receptor**
- **Meteorology constant in space and time**

$$\chi \propto \frac{q}{U \sigma_y \sigma_z}$$

- **RSAC model**
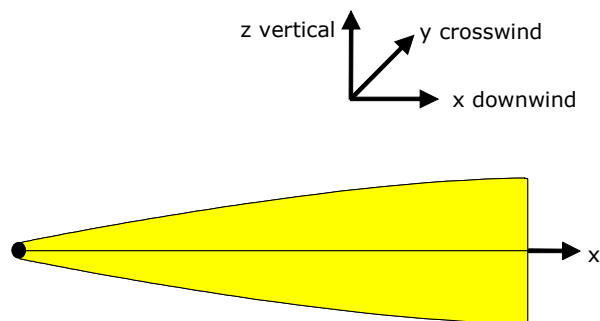
8.6   Spatial Variability in Winds
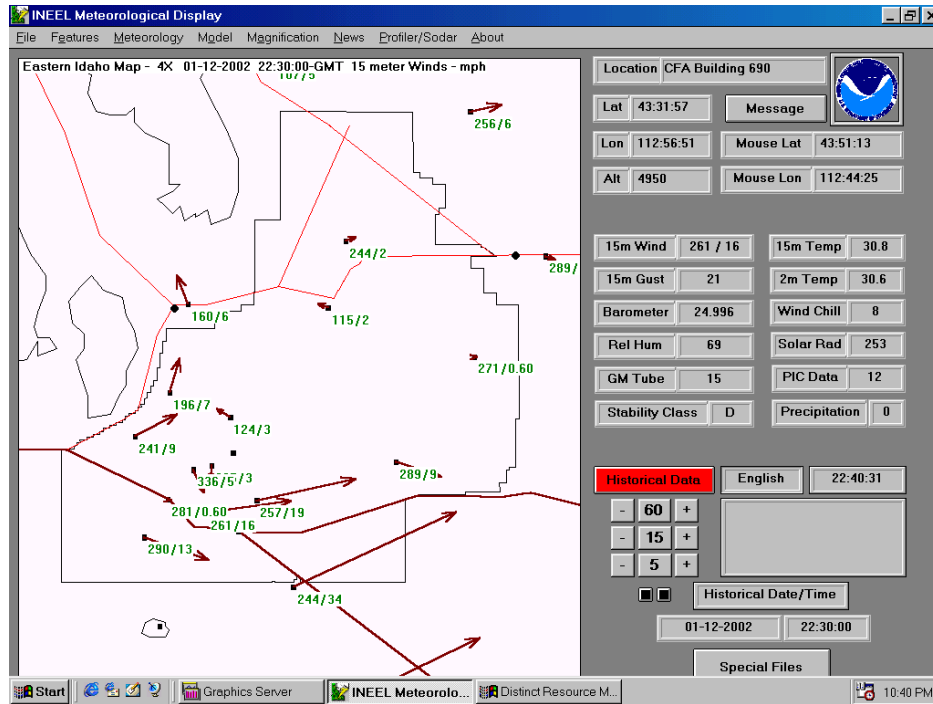
- **The variability of the winds from one tower to the next show why Gaussian plume modelling is often unrealistic**

8.7   Gaussian Puff Model

- **Treat release as a sequential series of instantaneous puffs**

- **Each puff moves independently based on nearby winds**

- **Older puffs may reach well-mixed condition with uniform vertical concentration**

- **Receptor concentration summation of contributions from many puffs**

$$\chi \propto \frac{Q}{\sigma_x \sigma_y \sigma_z}$$

- **MDIFF - The rightmost puff represents a well-mixed condition.**

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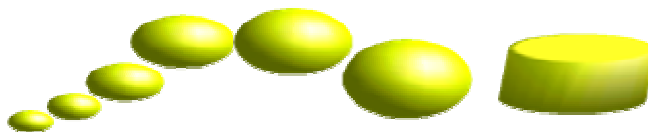
8.8   Vertical Growth
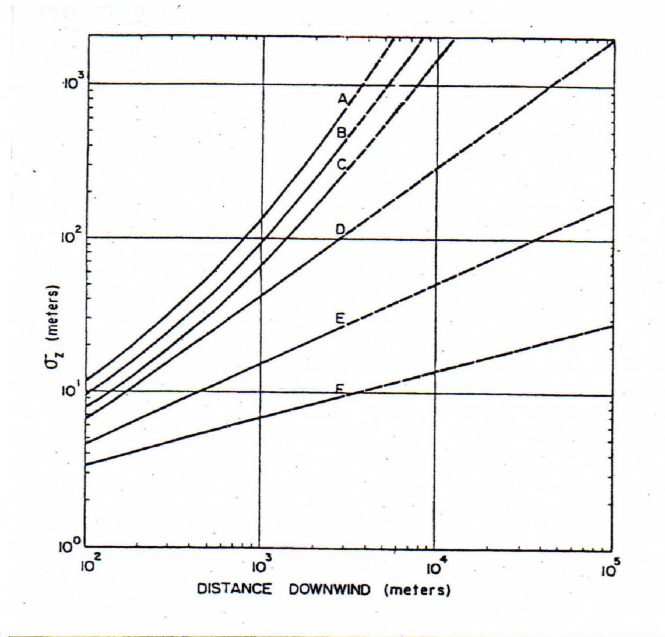
Figure VI-11. σ_z versus downwind distance as a function of stability class for a 15 to 60 minute release time (Markee, 1963). The dashed portions of each line represent extrapolations according to data from Fuquay et al., 1963).

8.9   Horizontal Growth
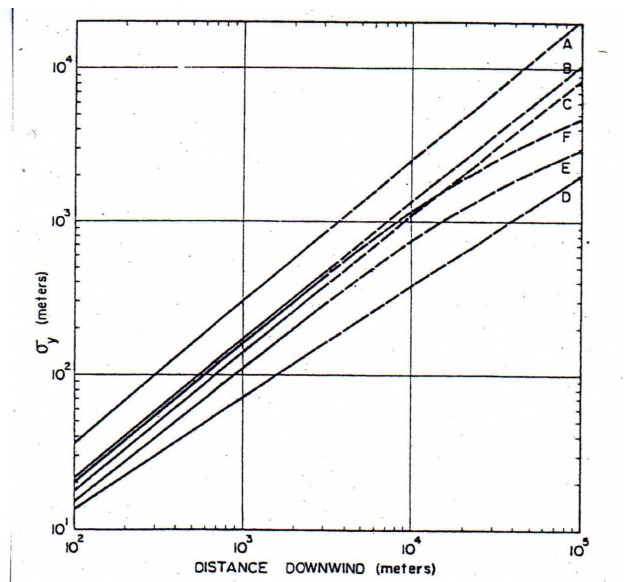
Figure VI-10. σ_y versus downwind distance as a function of stability class for a 15 to 60 minute release time (Markee 1963). The dashed portions of each line represent extrapolations according to data from Fuquay et al., 1963).

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8.10   Total Integrated Concentration

- **Time summation of concentration**

$$TIC = \sum \chi_j \delta t \approx \int \chi dt$$

- **Area under concentration curve**
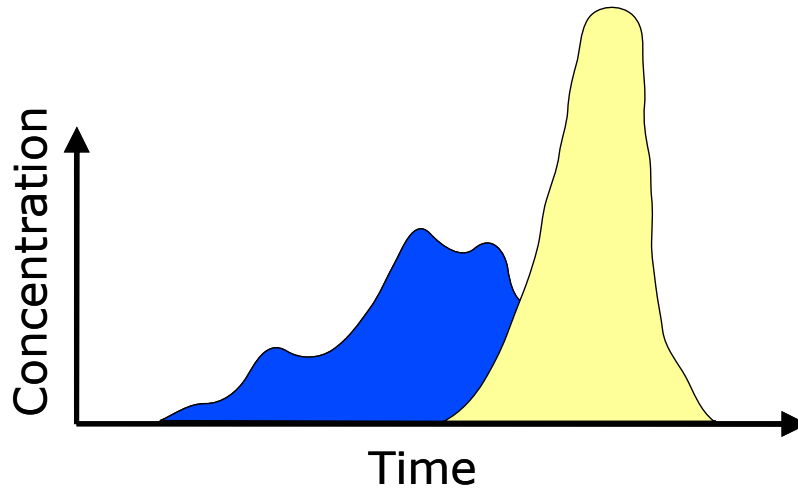
- **This diagram shows how Total Integrated Concentration is related to the area under the curve. The same Total Integrated Concentration can be obtained with either low concentrations over longer times or high concentrations over shorter times.**

8.11   Puff Trajectories

Hour 1

07:00 – 08:00 release

Hour 2

08:00 – 09:00 release

18

Hour 3

09:00 - 10:00 release

Hour 4

10:00 - 11:00 release
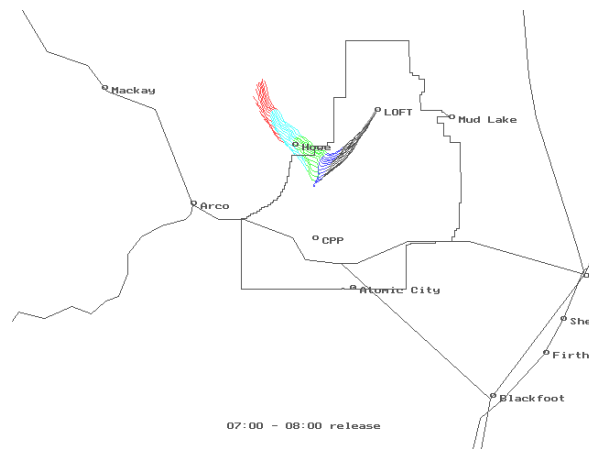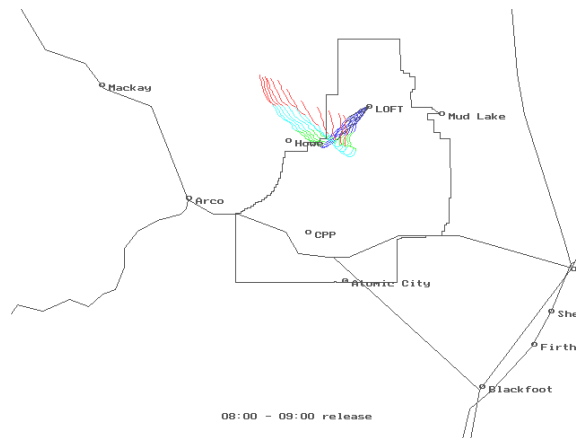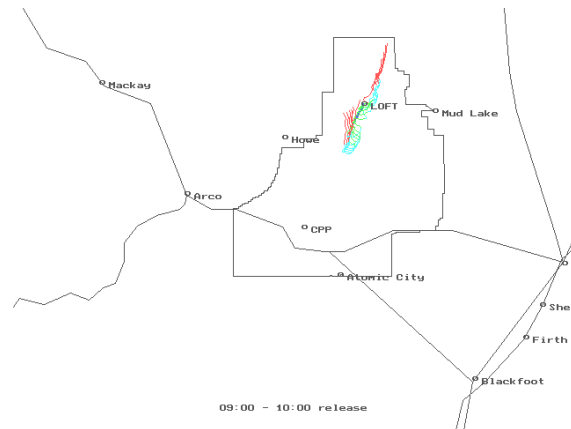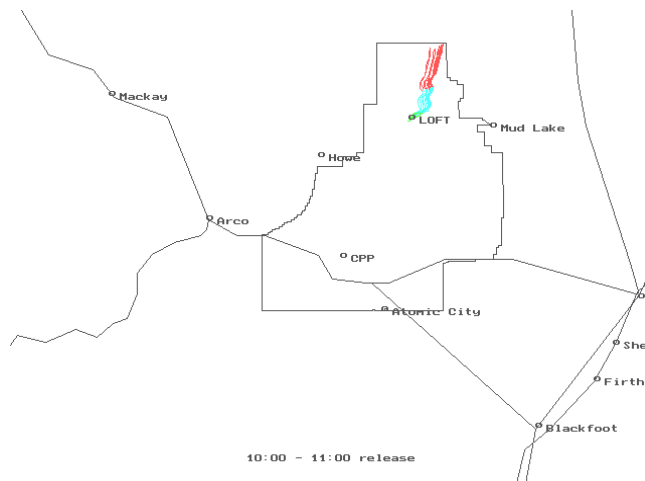
8.12　Four-hour TIC
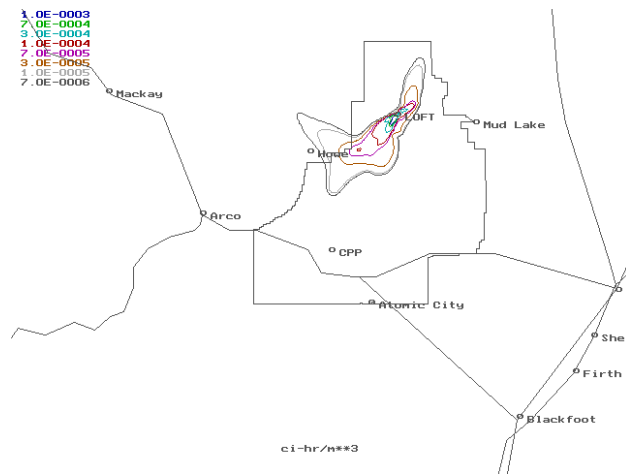
- **This graph shows how the varying wind directions in the previous graphs combine to create a complex TIC footprint**

8.13　Receptor Concentrations
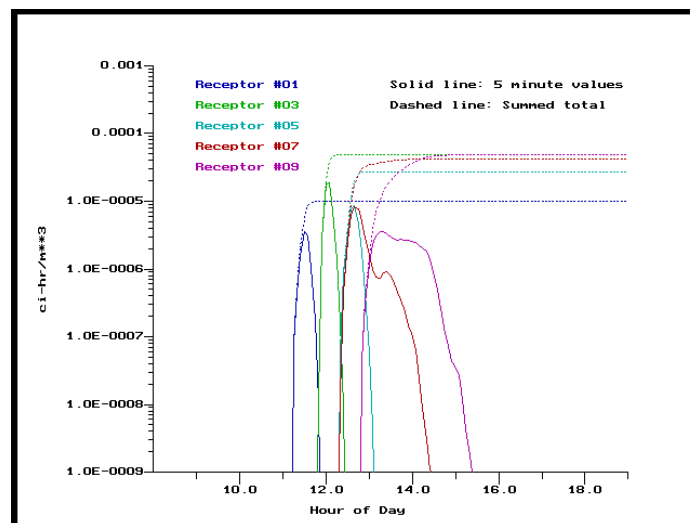
8.14   INEEL Viz-MDiff Interface
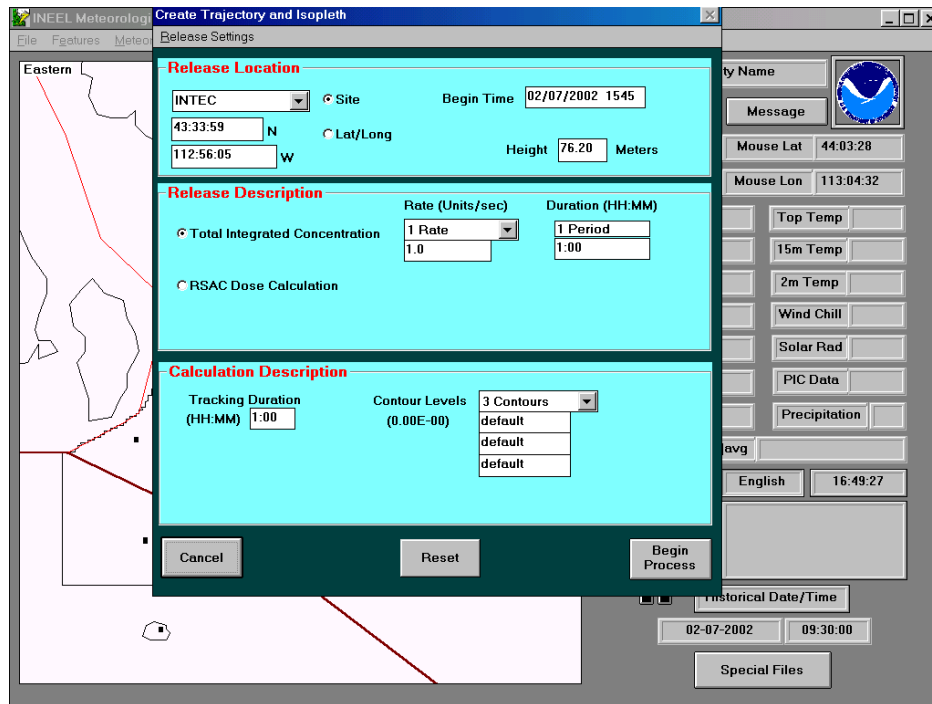
8.15   Displayed TIC
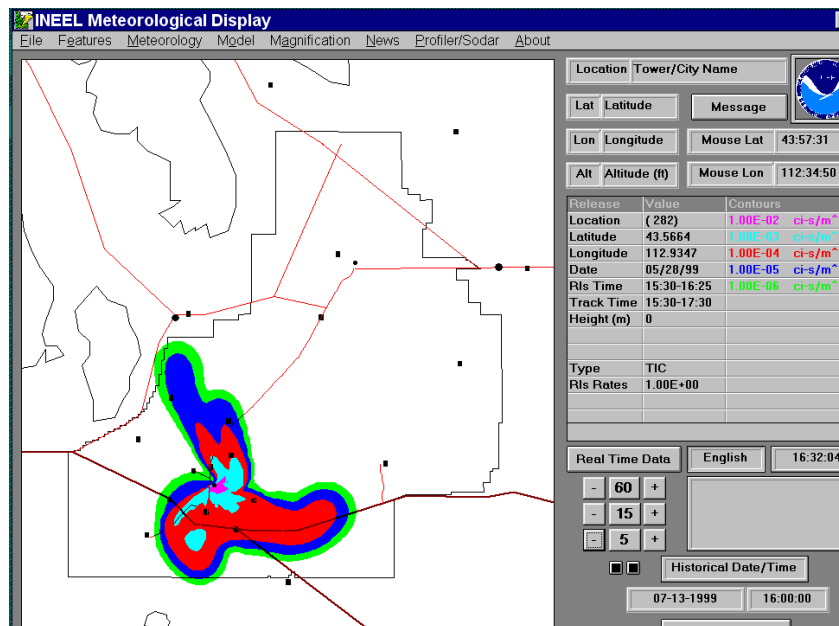
8.16   Radiological Dose Computations

- **MDIFF has no built-in radiological dose computations**
- **RSAC has dose computations, but is straight-line plume model**
- **Dose conversion factors derived by matching MDIFF TICs to RSAC doses for release scenarios**
- **Different conversion factors for different release inventories**

- $Dose = TIC \times f$

8.17   InelViz Dose Display
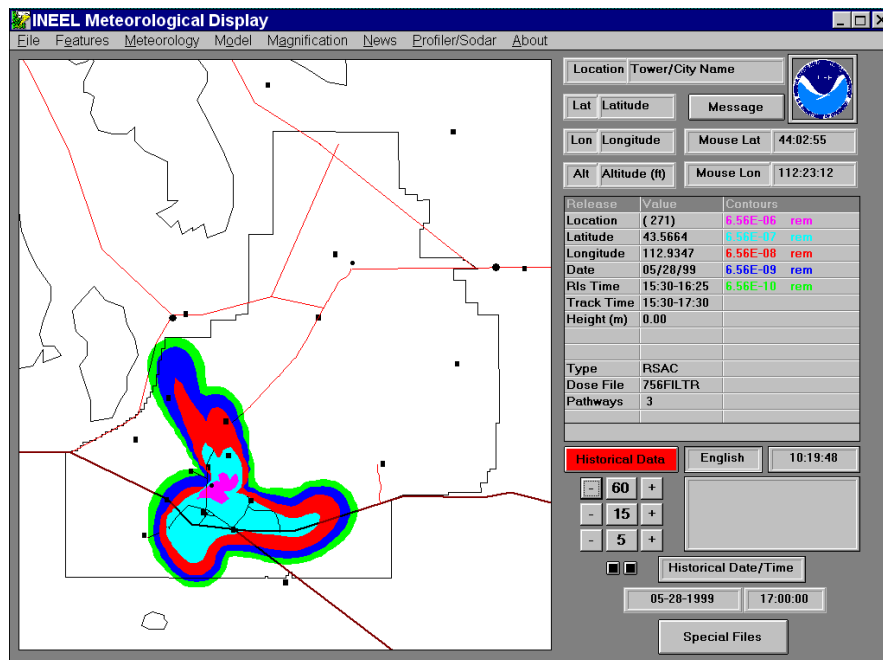
8.18   Model Uncertainty

- **Dispersion models are statistical in nature**
- **They provide estimates of mean concentration**
- **Mean may be something like 60th percentile (60% below, 40% above)**
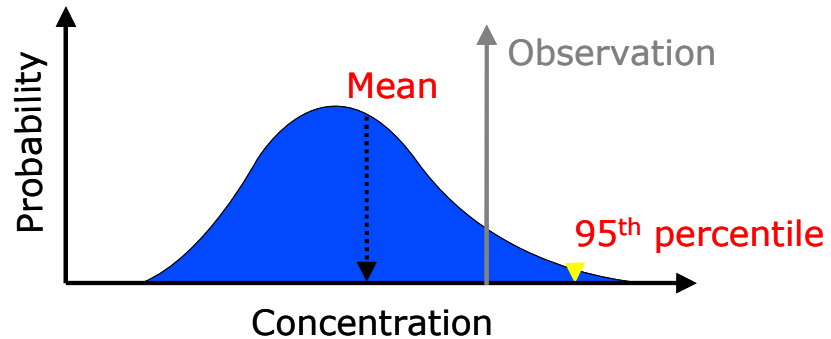
- **Several sources of model uncertainty**
- **Natural variability (statistical nature of model)**
- **Errors in input parameters**
- **Model physics errors**
- **Uncertainty must be considered when making decisions based on model output**
- **Don't assume one can take model output and "zoom in" to any scale desired**

9.0   Tips using InelViz

9.1   **Time Zone Setting -** The first time you run a newly installed version of InelViz the program will prompt you to enter the Time Zone setting. This should only be required 1 time. InelViz will automatically adjust between Daylight and Standard time.

9.2   **Retrieving Historical Data** - Three years of historical data is available through InelViz, but only 32 hours are available directly. When a request for historical data, older than 32 hours, is made the server has to generate the InelViz files from the 3 year database. In some instances the file generation may not complete in time for InelViz to retrieve it. If this happens you will receive an error message declaring that no data is available for the requested time. If this happens simply re-submit the request and the data should be available.

9.3   **Adjusting Computer Date and Time** - Each time you start InelViz it will compare the Date and Time against the Date and Time on the data server, in the FRD office. If the dates do not match InelViz will inform the user and ask if you would like to adjust the date on your local computer. If the answer is yes then InelViz will set the Date automatically. If there is more than a 5 minute difference between your computer and the data server then InelViz will inform you of this and ask if you want to adjust your computer time. If you answer yes InelViz will display the clock form, described in section 4.7. InelViz will **NOT** automatically adjust the time. The user must set the clock to the correct time.

9.4   **Previous Settings** - The *magnification*, the selected *map features* and *meteorological parameters* and the *special files* mode are preserved between InelViz sessions.

9.5   **1x Magnification**
    9.5.1   **Right Mouse button** - clicking the right mouse button, on a site within the map, will display the meteorological parameters associated with the selected site.
    9.5.2   **Left Mouse button** - Initially clicking on the map with the left mouse button will expand the map to 4x and center the INEEL within the map window. If the map has been expanded to another magnification then reduced to the 1x magnification a left mouse click will expand to the previous magnification with the INEEL centered in the map window.
    9.5.3   **Shift-Left Mouse button** - Holding the shift key while clicking the left mouse button will expand the map in the same manner as described above, the only difference is the selected location will now be centered in the window instead of the INEEL.

9.6   **2x - 32x Magnification**
    9.6.1   **Right Mouse button** - clicking the right mouse button, on a site within the map, will display the meteorological parameters associated with the selected site.
    9.6.2   **Left Mouse button** - centers the selected point in the map window.
    9.6.3   **Ctrl-Left Mouse button** - center the INEEL in the map window.

10.0 Upgrading InelViz

InelViz is a never ending work in progress therefore frequent upgrades are necessary. Upgrade announcements are usually sent using the InelViz message utility. We usually send a message informing the user of a new version, the version number and instructions for downloading. To upgrade first stop InelViz, then use any of the following approaches.

10.1 **Fetch** - This is an upgrade utility included when you install InelViz. Clicking the fetch icon will launch the fetch application and display the following dialog box.
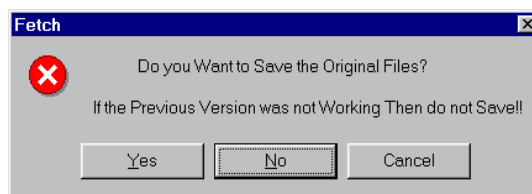
If the previous version of InelViz was working correctly, you will want to save it, in case the new version becomes corrupted during the download. If the previous version was not working then do not save it. The preceding message box will be followed by two others, after saving the original version and downloading the new version. When downloading is complete exit Fetch and restart InelViz. Check the version number described in section 5.8.1 to verify that the file transferred correctly.

10.2 **Web Site** - You can also go to the FRD web site and download an InelViz setup file. The site is located at the following address http://www.noaa.inel.gov/inelviz and provides instructions for downloading and installing.

10.3 **Floppy Disks** - In addition to the previous two methods we can mail you a set of disk for installing or upgrading InelViz.

Appendix A.   SYSTEM ERRORS AND DIAGNOSTICS

If there is a problem

1.   First make sure you can get the Meteorological data you need immediately. There are several backup sources. They do not have the capabilities of InelViz, but they will provide basic data.

   a.   Use a modem to dial in to the emergency backup system. We STRONGLY recommend that everyone have a modem connected to their InelViz computer and learn how to use it. There are instructions in Appendix B on the Emergency Backup System.
   b.   Call the NOAA ARL forecast desk at 526-2744. We can give you data and run models for you.
   c.   WCC and the Firehouse Alarm Room all have a direct feed of data.
   d.   You may contact NOAA by radio on H, C, and D net.

2.   Make sure your computer is working properly:

   a.   Try powering it off and restarting it.
   b.   Make sure that the network cables are not loose or disconnected.
   c.   Check the time on the computer
   d.   Make sure that there are not multiple copies of InelViz running and no other programs that could interfere with InelViz.
   e.   Make sure something is selected (checked) in the Meteorology menu.
   f.   Make sure InelViz is in the right mode. Make sure Historical Data or Special Files buttons are not red. Change the magnification to ensure that the screen is set up correctly.

3.   Check to see if the computer network is down. If no other computers will access network applications (e.g. Office Vision, NetWare Servers) the network is down. We send notices of scheduled network downtime via the InelViz Message utility.

4.   Call someone for help. Be ready to describe the problem as completely as you can. The more you know about the error, the easier it will be to resolve.

Appendix B.   Emergency Backup System

Some of the information available on InelViz is also provided through dial in modems. This provides a backup system for InelViz. If the computer network fails, InelViz users can dial in and continue to get current meteorological information. It is also appropriate to use this system to get meteorological information to locations that do not have an InelViz workstation. We only ask that you do not tie up the phone lines for extended periods of time so they are not available for emergency use. The telephone numbers for this system are:

   526-5770
   526-5733
   526-5818

To use this system, you need a 1200 baud modem and terminal emulation software. Most higher speed modems will support 1200 baud. Terminal emulation software is provided with windows. Set your software to 8 data bits, 1 stop bit, and no parity. Use your modem to dial in, and then wait. Every 5 minutes a new table of data will be sent.

Appendix C.   Meteorological Units and Definitions

Parameter	Units	Metric
15m Wind Direction	Degrees	N/A
15m Wind Speed	mph	m/s
15m Gust	mph	m/s
Top Wind	mph	m/s
Top Temperature	Fahrenheit	Celsius
15m Temperature	Fahrenheit	Celsius
2m Temperature	Fahrenheit	Celsius
Wind Chill	Fahrenheit	Celsius
Solar Radiation	Watts/m^2	N/A
Relative Humidity	%	N/A
Barometric Pressure	inches Hg	N/A
Precipitation	100th of an inch	N/A
GM Tubes	microR/hour	N/A
Pic Data	microR/hour	N/A
Electric Field	kilovolts/m	N/A
Stability Class	A,B,C,D,E,F	N/A

Wind Directions

Wind directions are given in degrees and specify the direction the wind is coming FROM. 0 degrees means the wind is blowing from the north towards the south. 90 degrees means it is blowing from east to west. 180 degrees means it is blowing from south to north.

Stability Class

Stability is a measure of the atmosphere's tendency to 'turn over'. In an unstable atmosphere, air at the surface tends to rise while the air above sinks, causing the atmosphere to mix. In a stable atmosphere, the surface air stays on the surface and no mixing or 'turning over' occurs. The amount of mixing affects the speed at which materials released into the atmosphere will diffuse or 'spread out'. The more mixing, the faster the diffusion. Atmospheric conditions at any given time will fall into six (or seven) "Stability Classes":

A	very unstable
B	moderately unstable
C	slightly unstable
D	neutral
E	slightly stable
F	moderately stable
G	very stable (used occasionally)

These classes are used by models performing calculations of atmospheric diffusion.

Relative Humidity (RH)

This is expressed as a percent of the air's maximum possible moisture content. Since the maximum possible moisture content varies with temperature, RH is also temperature dependent.

Barometric Pressures

These are given in inches of Mercury. They are NOT corrected for altitude and so are much lower than the corrected values commonly reported by TV and radio stations. Altitude differences account for much of the pressure differences you will observe between stations on the INEEL.

microR/hr

One one-millionth of a Roentgen per hour. A Roentgen is a unit of exposure which is a measure of ionization of air by gamma radiation. Note that a Rem is a unit of Dose Equivalent and is slightly different. (1 Roentgen = 0.8 Rem approximately.) Using the Roentgen value as an estimate of dose will always provide a conservative (i.e. slightly high) estimate.

These definitions along with others can be found in the News section of InelViz under Glossary.

Appendix D. FRD Station Acronyms

Station Acronym   Description

Station Acronym	Description
690	Central Facilities building 690
ABE	Aberdeen
ARC	Arco
ATO	Atomic City
BAS	Base of Howe Peak
BIG	Big Southern. Not on the butte, but southwest of it.
BLA	Blackfoot
BLU	Blue Dome
CRA	Craters of the Moon
DEA	Deadman
DUB	Dubois
EBR	EBR-II Experimental Breeder Reactor No. II a.k.a. ANL-W
EFS	INEEL Experimental Dairy Farm
FOR	Fort Hall community monitoring station
GRI	Grid III
HAM	Hamer
HOW	Howe
IDA	Idaho Falls
KET	Kettle Butte
LOF	LOFT near TAN - Test Area North
LOS	Lost River Rest Area
MAI	Main Gate
MIN	Minidoka
MON	Monteview
NRF	Naval Reactor Facility
PBF	Power Burst Facility
RIC	Richfield
ROB	Roberts
ROV	Rover
RWM	RWMC - Radioactive Waste Management Complex
SAN	Sand Dunes
SUG	Sugar City
TAB	Taber
TER	Terreton
TRA	Test Reactor Area

The tower acronyms can also be found in the InelViz Glossary.

Appendix E.   Default RSAC Dose Files

1.0   Example of several INTEC Default Release files and their description

602PUX	-	Release of Pu-239 from CPP-602, WITH ventilation
602PU1X	-	Release of Pu-239 from CPP-602, WITHOUT ventilation
ATR603AX	-	ATR fuel criticality in CPP-603 IFSF fuel handling cave, Class A, 100 m
ATR603DX	-	ATR fuel criticality in CPP-603 IFSF fuel handling cave, Class D, 644 m
ATR603FX	-	ATR fuel criticality in CPP-603 IFSF fuel handling cave, Class F, 13,500 m
BMI603AX	-	Pyrophoric reaction in CPP-603 IFSF fuel canning station, Class A, 100 m
BMI603DX	-	Pyrophoric reaction in CPP-603 IFSF fuel canning station, Class D, 300 & 644 m
BMI603FX	-	Pyrophoric reaction in CPP-603 IFSF fuel canning station, Class F (fumigation) 13,500 m
CT1666AX	-	Criticality in CPP-666 with one ventilation fan, Class A, 100 m

2.0   Example RSAC Dose Conversion file used by MDIFF to calculate Dose

Output Report for RSAC5 - ER
File Name: 756FILTR
INTEC - Offgas Systems Filter Fire of CPP-756 and CPP-649
Release Time :   Scale Factor : 1.000
Active Safety Systems : None

Normalized Dose Conversion Factors (rem-m^3/s)

Time (s)	Inhalation	Ingestion	Ground Sur	Air Immer	Total
0.0e+01	6.564e+00	no calc	5.154e-04	1.064e-04	6.564e+00
0.0e+01	6.564e+00	no calc	5.154e-04	1.064e-04	6.564e+00
0.0e+01	6.564e+00	no calc	5.154e-04	1.064e-04	6.564e+00
0.0e+01	6.564e+00	no calc	5.154e-04	1.064e-04	6.564e+00
0.0e+01	6.564e+00	no calc	5.154e-04	1.064e-04	6.564e+00
0.0e+01	6.564e+00	no calc	5.154e-04	1.064e-04	6.564e+00
0.0e+01	6.564e+00	no calc	5.154e-04	1.064e-04	6.564e+00
0.0e+01	6.564e+00	no calc	5.154e-04	1.064e-04	6.564e+00

Appendix F. Questions

Data Display Section

1.   Set the clock to the current time.

2.   Set your time zone to mountain daylight time.

3.   Display the current message.

4.   Find the longitude, latitude, and altitude of Deadman.
        longitude:_____   latitude:_____   altitude:_____

5.   Find the longitude and latitude of INTEC.
        longitude:_____   latitude:_____

6.   Turn on tower names and all roads.

7.   Display map at 2X magnification and center the INEEL. Is Dubois still
        on the map? []Yes   []No

8.   Find the Rover (ROV) site.

9.   Find the distance from Dubois to LOF.   miles: _____   kilometers:_____

10.   Turn off site names. Turn on contours and primary site roads only.

11.   Find the temperature at Craters of the Moon 1 hour ago:_____
                                        yesterday at 8:00 a.m. _____

12.   Use discrimination level to find the highest current temperature._____

13.   Display 15m wind arrows and 15m wind data. What is the wind speed and direction at Idaho
        Falls? Include the units.
        speed:_____   units:_____   direction:_____   units:_____

14.   What is the date and time of the data on the screen?
        GMT:_____   MDT:_____   MST:_____ local time:_____

15.   Find current conditions at Monteview.
              Temp:_____   wind direction:_____   rh:_____

        What   are the same values in metric units?
        Temp:_____   wind direction:_____   rh:_____

16. Display barometric pressure on the map. Why are there differences?

17. What is the solar radiation at Dubois? _____ Units:_____

18. Compare PIC and GM Tube readings at ROV. Are they different? []Yes []No
Is the difference significant? []Yes []No   What are the units?_____

19. Compare top wind and 15m wind at EBR-II. Is the top wind []slower or []faster? Is top
temperature []warmer or []cooler than the 2 meter temperature?

20. What is the stability class at NRF?_____

21. What is the forecast high temperature at CFA for today?_____

22. Which towers are over 15 meters tall?_____

23. What is telephone number of NOAA forecast desk?_____

24. Find the current version of InelViz._____

25. Set the historical date and time to April 1, 2001, 13:00 MDT. Turn on Special files. Is
this actual data? []Yes []No Why not?_____

Model Display Section

1. Set the Release time back 1 hour from the current clock time.

Run the Model with the following Parameters:

	Rates	Durations	Contour Levels
	200.00	25 min	le-03
Release Location:LOFT	132.00	10 min	8e-06
Release Type: TIC	75.00	1 hr. 05 min	2e-02
	20.00	1 hr.	7e-03
			7e-05

What is the Height of the Release Point?_____

What is the Latitude and Longitude of the Release Point?_____

Does the order of the Contour Values correspond with the order they were entered in?

What is the Total Length of time for the Release?_____

Does this match the length specified? _____ Why?_____

2.   Enable Forecast mode and run the Model again.

What is the difference between the two runs? _____ Why?_____

3.   Change the tracking time to 5 hours and Run the Model again.

What is the release time?_____ What is the tracking time?_____

4.   Rerun the Model, using defaults, from the lower left-hand corner of the INEEL.

What is the Latitude and Longitude of the Release Point?_____

What are the contour values?_____

5.   Run the Model from TRA using RSAC with the ATRSLOCA scenario. Select the Total

Dose calculation and set the release time back 3 hours and track the release for 4 hours.

What is the height of this release?_____

What is the highest output from this release?_____

What is the description of this accident?_____

What dose pathways were used in this calculation?_____

6.   Remove the Trajectories by selecting the correct Menu item.

7.   Rerun the Model releasing only 10% of the releasable inventory.

What is the model run number?_____

What is the highest output from this release?_____

How wide is the plume in miles?_____ In kilometers?_____

8.   Run the Model again in snap-shot mode.

What time frame for the model output are we looking at?_____

What is the output from this release in millirem?_____

9.   Redisplay the Model with the Trajectories showing.